

Design and Control of a Twelve-Bar Tensegrity Robot

Completed Technology Project (2016 - 2017)



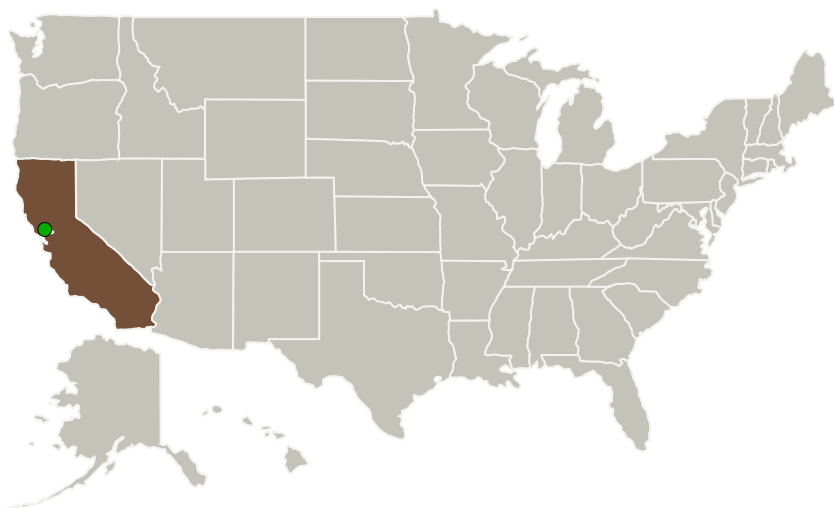
Project Introduction

A tensegrity (tensional integrity) robot is a lightweight, compliant system consisting of rods suspended in a network of cables. It can absorb large loads on impact, and it can move by actuating its cables. Thus a tensegrity robot can act as both a lander and rover, which is unique from traditional rovers that require separate, complex landing systems. The functionality of tensegrity robots will drastically reduce the cost and complexity of surface exploration missions. Prior work between NASA Ames and the University of California, Berkeley, on tensegrity robotics has utilized a six-bar structure. This work revealed shortcomings to the six-bar structure, such as limited payload-to-deadweight mass ratio, impact orientation sensitivity, and high actuation effort. I propose to develop a twelve-bar tensegrity robot as a solution to these shortcomings. I will approach this research by conducting simulations, constructing a rapid prototype, and then creating two high-fidelity prototypes of the twelve-bar tensegrity robot. This work advances the efficacy of surface exploration missions in support of TA 4, Robotics and Autonomous Systems, and the TAB 4.2, Mobility.

Anticipated Benefits

This work advances the efficacy of surface exploration missions in support of TA 4, Robotics and Autonomous Systems, and the TAB 4.2, Mobility.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
University of California-Berkeley(Berkeley)	Lead Organization	Academia	Berkeley, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California

Project Website:

<https://www.nasa.gov/strg#.VQb6T0jJzyE>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

University of California-Berkeley (Berkeley)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

Alice M Agogino

Co-Investigator:

Mallory C Daly

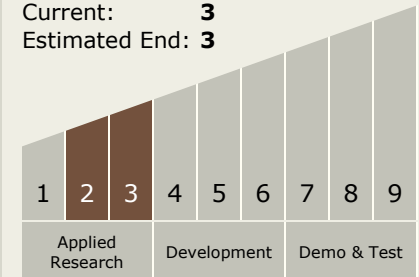
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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.2 Mobility
 - └ TX04.2.4 Surface Mobility

Target Destinations

The Moon, Mars, Others Inside the Solar System